

REMARKS

The Final Office Action mailed October 20, 2005, has been received and reviewed. Claims 26 through 38 and 40 through 46 are currently pending in the application. Claims 26, 27, 30 through 37, and 40 stand rejected. Claims 28 and 29 have been objected to as being dependent upon rejected base claims, but the indication of allowable subject matter in such claims is noted with appreciation. Claims 38 and 41 through 46 are allowed. Applicants propose to amend claim 26, and respectfully request reconsideration of the application as proposed to be amended herein.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 6,049,129 to Yew et al.

Claims 26, 27, 30, 32, 36 and 40 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yew et al. (U.S. Patent No. 6,049,129). Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Verdegaal Brothers v. Union Oil Co. of California, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. Richardson v. Suzuki Motor Co., 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Applicants respectfully assert that independent claim 26 is not anticipated by U.S. Patent 6,049,129 to Yew, et al. (hereinafter “Yew”) because Yew does not expressly or inherently describe “a plurality of wire bonds extending between...bond pads and...conductive bumps, each wire bond of the plurality having a first end directly attached to a bond pad...and a second end directly attached to a conductive bump...,” as recited in independent claim 26 as currently amended.

Yew describes a silicon chip where “bonding pads 120 are connected to routing strips 82 and bus bars 110 by wire bonding 80.” Yew, col. 5, lines 16-18. Yew teaches that the bonding pads 120 are connected by wire bonds 80 to routing strips (traces) 82 that are connected to vias

84, which are connected to pads 100, which are finally connected to conductive bumps 150. Yew does not expressly or inherently describe or disclose wire bonds having a first end attached to a bond pad 120 and a second end attached to a conductive bump 150.

As Yew does not expressly or inherently describe each and every element set forth in independent claim 26, Applicants assert that claim 26 is not anticipated by Yew and respectfully request that the Examiner withdraw the rejection of independent claim 26 under 35 U.S.C. § 102(b).

Additionally, Applicants respectfully assert that independent claim 26 is not anticipated by Yew because Yew does not expressly or inherently describe “at least one anisotropically conductive layer,” as recited in independent claim 26 as currently amended. As has been asserted in previously filed responses in regards to the present application, Yew lacks any express or inherent description or disclosure of an anisotropically conductive layer, material, or structure whatsoever. One of ordinary skill in the art would recognize the term of art “anisotropically conductive layer” as meaning a layer exhibiting conductive properties that differ according to direction. Placing a conductive via transversely through a nonconductive material may allow for conduction of electricity in a single direction, but it does not make the resulting structure an anisotropically conductive layer as that term is used in the art. One of ordinary skill in the art would be familiar with commercial anisotropically conductive products available as strips of tape or films and would not confuse a strip of anisotropically conductive tape or film as being equivalent to a conductive via formed through a printed circuit board. Consequently, Yew neither expressly nor inherently describes nor discloses an anisotropically conductive layer.

For this additional reason, Applicants assert that Yew does not anticipate claim 26 and respectfully request that the Examiner withdraw the rejection of independent claim 26 under 35 U.S.C. § 102(b).

Each of claims 27, 30, 32, 36, and 40 is allowable, among other reasons, for depending either directly or indirectly from claim 26, which is allowable.

Claim 30 should be allowed because a “tape or film” is conventionally known in the art as a thin substrate or coating. Yew does not expressly or inherently describe or disclose a tape or film. To the contrary, Yew describes a rigid, multi-layer printed circuit board that forms an

essential structural component of the semiconductor substrate assembly. Thus, claim 30 is not anticipated.

Claim 32 is additionally allowable as Yew fails to describe an anisotropically conductive layer attached to an active surface of a semiconductor die by an adhesive. Element 70 of Yew is a three-layer (72, 74, 76) printed circuit board, not an anisotropically conductive layer.

For each of the reasons set forth above, withdrawal of the 35 U.S.C. § 102(b) rejections of claims 26, 27, 30, 32, 36, and 40 is respectfully solicited.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 6,049,129 to Yew et al. in view of U.S. Patent No. 5,858,816 to Sato et al.

Claim 31 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al. (U.S. Patent No. 6,049,129) in view of Sato et al. (U.S. Patent No. 5,858,816). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

Applicants assert that claim 31 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering Yew in view of U.S. Patent No. 5,858,816 to Sato et al. (hereinafter "Sato") because the cited references, when combined, do not teach or suggest all the limitations of claim 31. Claim 31 directly depends from independent claim 26 and includes each of the limitations recited therein.

Yew and Sato together do not teach or suggest "at least one anisotropically conductive layer" or "a plurality of wire bonds extending between...bond pads and...conductive bumps,

each wire bond of the plurality having a first end directly attached to a bond pad...and a second end directly attached to a conductive bump...,” as recited in independent claim 26 as currently amended.

Yew does not teach or suggest that the wire bonds described therein have a first end attached to a bond pad 120 and a second end attached to a conductive bump 150 for substantially the same reasons previously discussed herein. Furthermore, Yew does not teach or suggest that the integrated circuit package described therein includes an anisotropically conductive layer.

Sato describes, with reference to Figures 2 and 3, a plastic package that includes a semiconductor element 6 attached to a multi-layer circuit board. Sato, column 3, lines 58-61; column 4, lines 18-19. Bonding pads 6a of the semiconductor element 6 are wire-bonded to bonding pads 7a on the multi-layer circuit board. Id., column 6, lines 8-12. Sato does not teach or suggest that the wire bonds described therein have a first end attached to a bond pad 6a and a second end attached to a conductive bump. Furthermore, Sato does not teach or suggest that the plastic package described therein includes an anisotropically conductive layer.

As Yew and Sato, when combined, do not teach or suggest each and all the limitations of claim 31, Applicants respectfully assert that claim 31 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering Yew in view of Sato, and request that the Examiner withdraw the rejection of independent claim 31 under 35 U.S.C. § 103(a).

Obviousness Rejection Based on U.S. Patent No. 6,049,129 to Yew et al. in view of U.S. Patent No. 5,796,170 to Marcantonio

Claims 33 and 34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al. (U.S. Patent No. 6,049,129) in view of Marcantonio (U.S. Patent No. 5,796,170). Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants assert that claims 33 and 34 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering Yew in view of U.S. Patent No. 5,796,170 to Marcantonio (hereinafter “Marcantonio”) because the cited references, when combined, do not teach or suggest all the limitations of either claim 33 or claim 34.

Claims 33 and 34 each depend from independent claim 26, and each includes each of the limitations recited in claim 26.

Yew and Marcantonio together do not teach or suggest “at least one anisotropically conductive layer” or “a plurality of wire bonds extending between...bond pads and...conductive bumps, each wire bond of the plurality having a first end directly attached to a bond pad...and a second end directly attached to a conductive bump...,” as recited in independent claim 26 as currently amended.

Yew does not teach or suggest that the wire bonds described therein have a first end attached to a bond pad 120 and a second end attached to a conductive bump 150 for the same reasons previously discussed herein. Furthermore, Yew does not teach or suggest that the integrated circuit package described therein includes an anisotropically conductive layer.

Marcantonio describes, with reference to Figure 3, a ball grid array package that includes an integrated circuit 112 bonded to a heat spreader 114. Bond pads 116 of the integrated circuit are electrically connected via electrically conductive leads 118 to conductive traces 120 defined by an electrical conductive layer 128 within the dielectric body of the package.” Marcantonio, column 4, lines 9-14, 31-40. Marcantonio does not teach or suggest that the wire bonds described therein have a first end attached to a bond pad 6a and a second end attached to a conductive bump. Furthermore, Marcantonio does not teach or suggest that the plastic package described therein includes an anisotropically conductive layer.

As Yew and Marcantonio, when combined, do not teach or suggest each and all the limitations of either claim 33 or claim 34, Applicants respectfully assert that claims 33 and 34 could not have been obvious to a person of ordinary skill in the art at the time the inventions were made considering Yew in view of Marcantonio, and request that the Examiner withdraw the rejection of claims 33 and 34 under 35 U.S.C. § 103(a).

Regarding claim 33, Applicants additionally assert that the combination of Yew and Marcantonio does not teach or suggest wire bonds extending between a plurality of conductive bumps and a plurality of terminal pads of a substrate. The Examiner asserts at Page 5 of the outstanding Office Action that Figure 3 of Marcantonio shows wire bonds 118 “between” a plurality of conductive bumps and a plurality of terminal pads. However, Marcantonio clearly

illustrates and confirms in his specification at column 4, lines 32-40, by reference to column 4, lines 9-15, that elements 118 are “conductive leads” which connect bond pads 116 to conductive traces 120. Claim 33 clearly requires wire bonds extending between the plurality of conductive bumps and the plurality of terminal pads of the substrate. Accordingly, the combination of Yew and Marcantonio fails to teach or suggest every element of claim 33.

Claim 34 is allowable, among other reasons, for depending either directly or indirectly from claim 33, which is allowable.

Therefore, Applicants respectfully assert that claims 33 and 34 could not have been obvious to a person of ordinary skill in the art at the time the inventions were made considering Yew in view of Marcantonio, and request that the Examiner withdraw the rejection of claims 33 and 34 under 35 U.S.C. § 103(a) for these additional reasons.

Obviousness Rejection Based on U.S. Patent No. 6,049,129 to Yew et al. in view of U.S. Patent No. 6,806,560 to Kobayashi

Claim 35 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al. (U.S. Patent No. 6,049,129) in view of Kobayashi (U.S. Patent No. 6,806,560). Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants assert that claim 35 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering Yew in view of U.S. Patent No. 6,806,560 to Kobayashi (hereinafter “Kobayashi”) because the cited references, when combined, do not teach or suggest all the limitations of claim 35. Claim 35 depends indirectly from independent claim 26 and includes each of the limitations recited in claim 26.

Yew and Kobayashi together do not teach or suggest “at least one anisotropically conductive layer” or “a plurality of wire bonds extending between...bond pads and...conductive bumps, each wire bond of the plurality having a first end directly attached to a bond pad...and a second end directly attached to a conductive bump...,” as recited in independent claim 26 as currently amended.

Yew does not teach or suggest that the wire bonds described therein have a first end attached to a bond pad 120 and a second end attached to a conductive bump 150 for the same

reasons previously discussed herein. Furthermore, Yew does not teach or suggest that the integrated circuit package described therein includes an anisotropically conductive layer.

Figure 2D of Kobayashi shows a flip-chip configuration where the underfill material 32 surrounds the conductive bumps 24 after they have been electrically bonded to a printed circuit board 30. The semiconductor substrate assembly of claim 35 is not recited to be in a flip-chip configuration and the conductive bumps are not bonded to a printed circuit board. Kobayashi does not teach or suggest that the wire bonds described therein have a first end attached to a bond pad and a second end attached to a conductive bump. Furthermore, Kobayashi does not teach or suggest that the integrated circuit package described therein includes an anisotropically conductive layer.

Further, since the semiconductor substrate assembly recited in claim 35 is not a flip-chip configuration, then there is no motivation to modify Yew with Kobayashi and cover the conductive bumps with a dielectric layer to absorb stress caused by a difference in the thermal expansion coefficient between the semiconductor and the printed circuit board because the printed circuit board is not a recited part of the assembly. Further, disposing a dielectric layer over the conductive bumps in the apparatus as claimed based on the Examiner's reasoning would render it inoperative since the covered conductive bumps as claimed would be unable to make an electrical connection in a flip-chip configuration.

Claim 35 is additionally allowable, among other reasons, for depending either directly or indirectly from claims 26 and 32, which are allowable.

For each of these reasons, Applicants respectfully assert that claim 35 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering Yew in view of Kobayashi, and request that the Examiner withdraw the rejection of claim 35 under 35 U.S.C. § 103(a).

Obviousness Rejection Based on U.S. Patent No. 6,049,129 to Yew et al. in view of U.S. Patent No. 6,727,519 to Wu

Claim 37 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al. (U.S. Patent No. 6,049,129) in view of Wu (U.S. Patent No. 6,727,519). Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants assert that claim 37 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering Yew in view of U.S. Patent No. 6,727,519 to Wu (hereinafter “Wu”) because the cited references, when combined, do not teach or suggest all the limitations of claim 37. Claim 37 depends directly from independent claim 26 and includes each of the limitations recited in claim 26.

Yew and Wu together do not teach or suggest “at least one anisotropically conductive layer” or “a plurality of wire bonds extending between...bond pads and...conductive bumps, each wire bond of the plurality having a first end directly attached to a bond pad...and a second end directly attached to a conductive bump...,” as recited in independent claim 26 as currently amended.

Yew does not teach or suggest that the wire bonds described therein have a first end attached to a bond pad 120 and a second end attached to a conductive bump 150 for the same reasons previously discussed herein. Furthermore, Yew does not teach or suggest that the integrated circuit package described therein includes an anisotropically conductive layer.

Wu does not teach or suggest wire bonds that have a first end attached to a bond pad and a second end attached to a conductive bump. Furthermore, Wu does not teach or suggest that the package structure described therein includes an anisotropically conductive layer that includes a plurality of laterally isolated conductive elements disposed in a dielectric material and has upper ends exposed therethrough attached to an active surface of a semiconductor die, as recited in independent claim 26.

Therefore, Applicants respectfully assert that claim 37 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering Yew in view of Wu, and request that the Examiner withdraw the rejection of claim 37 under 35 U.S.C. § 103(a).

Objections to Claims 28 through 29/Allowable Subject Matter

Claims 28 and 29 stand objected to as being dependent upon rejected base claims, but are indicated to contain allowable subject matter and would be allowable if placed in appropriate independent form. Applicants propose to amend independent claim 26, from which each of claims 28 and 29 indirectly depends. Applicants respectfully assert that claim 26, as proposed to be amended herein, is allowable, and that claims 28 and 29 are therefore no longer dependent upon a rejected base claim.

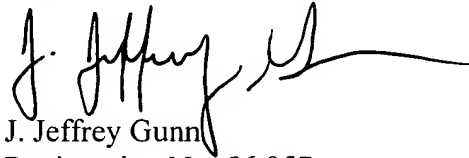
ENTRY OF AMENDMENTS

The proposed amendments to claim 26 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Claims 26 through 38 and 40 through 46 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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